WATER RESOURCES REVIEW for APRIL 1975

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CANADA
DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES BRANCH

STREAMFLOW AND GROUND–WATER CONDITIONS

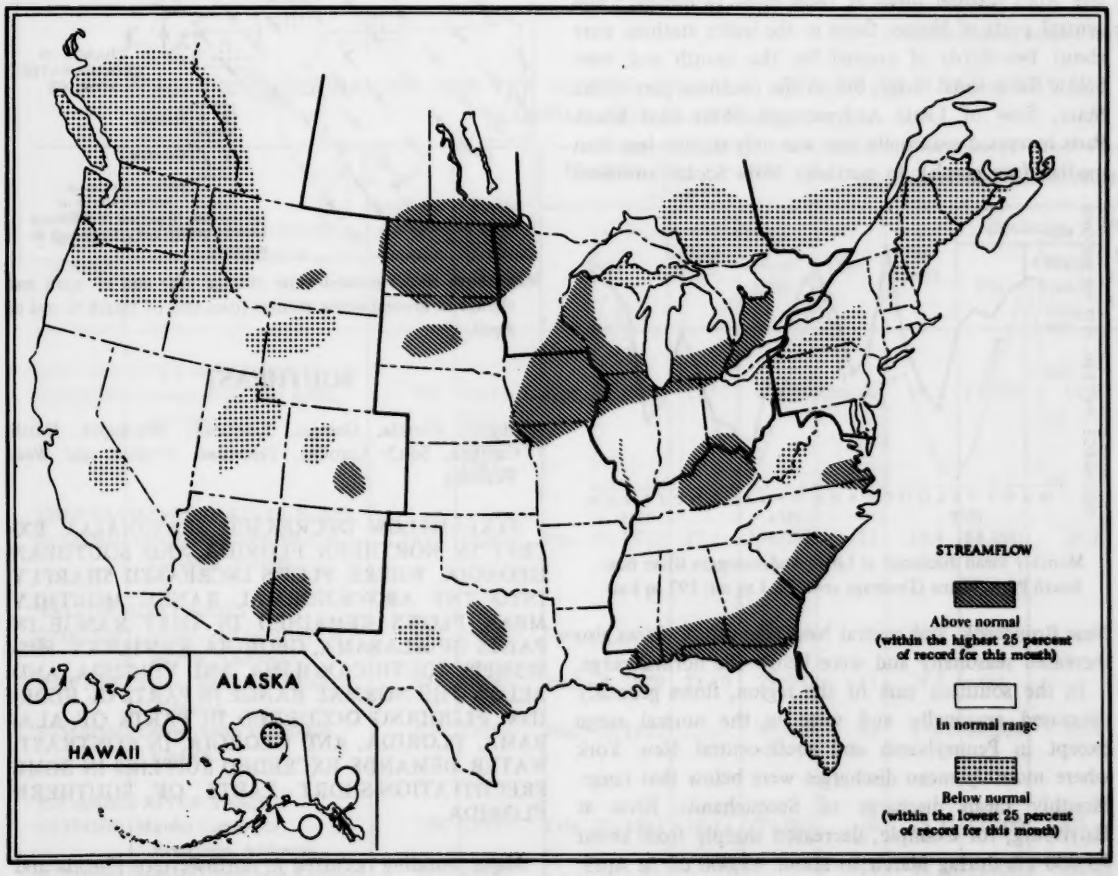
Streamflow increased seasonally in most of southern Canada and the northern and western States, decreased in many eastern and central States, and was variable elsewhere, including Alaska and Hawaii.

Below-normal flows persisted in parts of Alberta, British Columbia, and Quebec in Canada, in several western States, and in parts of Alaska and Florida.

Record-low monthly and daily mean discharges occurred on several streams in mountainous areas of the western States as a result of retarded snowmelt runoff, caused by below-normal temperatures.

Flooding occurred in Alabama, Florida, Georgia, Illinois, Indiana, Iowa, Louisiana, Michigan, Minnesota, Missouri, and Wisconsin.

Water supply conditions worsened in southern Florida, as supplies from wells and streams were exceeded by demands, resulting in some restrictions on water use for lawn and garden sprinkling. Ground-water levels in some areas approached or equalled the very low levels of 1971.



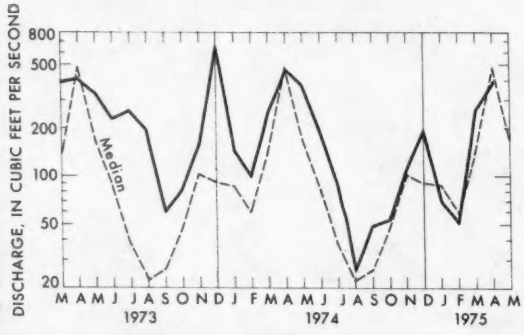
CONTENTS OF THIS ISSUE: Northeast, Southeast, Western Great Lakes region, Midcontinent, West; Supplemental data for six-month period ending March 31, 1975; Hydrographs of some large rivers; Usable contents of selected reservoirs near end of April 1975; Index stations and selected large-river stream-gaging stations in the West region; Basic data reports on stream discharges in the United States; Flow of large rivers during April 1975; Alaska; Availability of ground water in the lower Pawcatuck River basin, Rhode Island.

NORTHEAST

[Atlantic Provinces and Quebec; Delaware, Maryland, New York, New Jersey, Pennsylvania, and the New England States]

STREAMFLOW GENERALLY WAS BELOW NORMAL IN ALL PARTS OF THE REGION, BUT INCREASED SEASONALLY IN THE CANADIAN PROVINCES AND IN THE NORTHERN STATES, AND GENERALLY DECREASED SEASONALLY IN THE SOUTHERN PART.

Below-normal temperatures retarded snowmelt in the northern parts of the region, resulting in monthly mean discharges at some index stations in Quebec, New Brunswick, Nova Scotia, Maine, and New Hampshire that were below the normal range. The mean discharge of 1,060 cfs on Upsalquitch River at Upsalquitch (drainage area, 877 square miles), in northern New Brunswick, and the mean of 806 cfs on Harricana River at Amos (drainage area, 1,430 square miles) in southwestern Quebec, were only about one-third the respective April median flows at those sites. In northern and central parts of Maine, flows at the index stations were about two-thirds of normal for the month and were below the normal range, but in the southern part of the State, flow of Little Androscoggin River near South Paris increased seasonally and was only slightly less than median (see graph). In northern Nova Scotia, southern

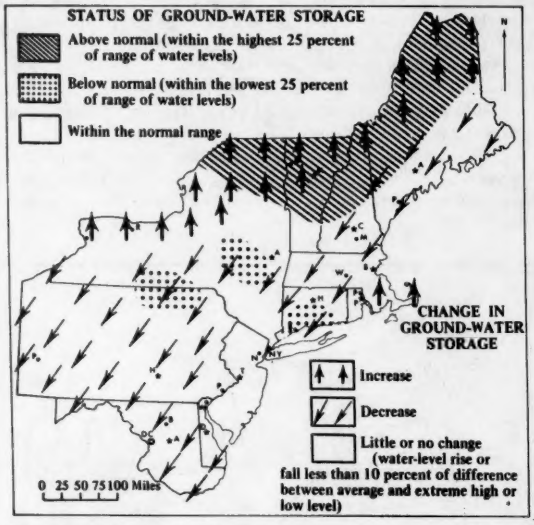


Monthly mean discharge of Little Androscoggin River near South Paris, Maine (Drainage area, 76.2 sq mi; 197 sq km)

New Brunswick, and central New Hampshire, flows also increased seasonally and were below the normal range.

In the southern part of the region, flows generally decreased seasonally and were in the normal range except in Pennsylvania and south-central New York where monthly mean discharges were below that range. Monthly mean discharge of Susquehanna River at Harrisburg, for example, decreased sharply from about 73,000 cfs during March to about 43,000 cfs in April. The normal seasonal decrease during that period is from about 73,000 cfs to about 69,000 cfs.

Ground-water levels rose along the northern borders of the region and generally declined elsewhere (see map). Exceptions were rising levels in southeastern Massachusetts and relatively minor fluctuations in New Jersey and on Long Island, N.Y. Monthend levels were above average in northern parts of New York and New England. Elsewhere in the region, levels were mostly in the normal range but were below normal in parts of central and western Connecticut, east-central and south-central New York, and adjacent north-central Pennsylvania.


STATUS OF GROUND-WATER STORAGE
Above normal (within the highest 25 percent of range of water levels)
Below normal (within the lowest 25 percent of range of water levels)
Within the normal range
N
CHANGE IN GROUND-WATER STORAGE
Increase
Decrease
Little or no change (water-level rise or fall less than 10 percent of difference between average and extreme high or low level)
0 25 50 75 100 Miles

Map above shows ground-water storage near end of April and change in ground-water storage from end of March to end of April.

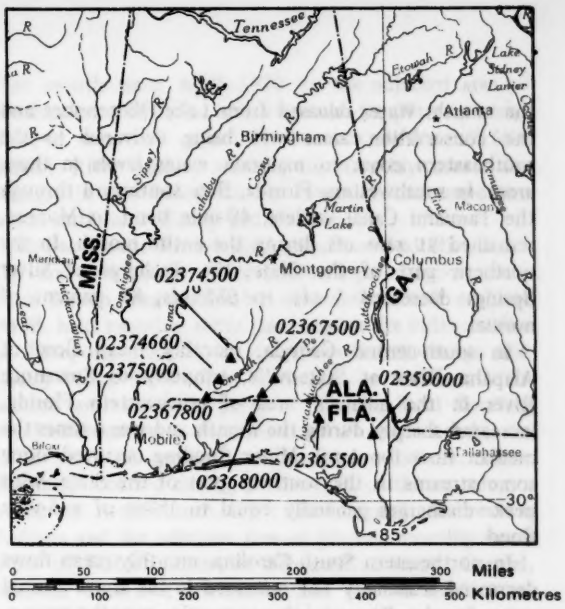
SOUTHEAST

[Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia]

STREAMFLOW DECREASED SEASONALLY EXCEPT IN NORTHERN FLORIDA AND SOUTHERN GEORGIA, WHERE FLOWS INCREASED SHARPLY INTO THE ABOVE-NORMAL RANGE. MONTHLY MEAN FLOWS REMAINED IN THAT RANGE IN PARTS OF ALABAMA, GEORGIA, KENTUCKY, MISSISSIPPI, SOUTH CAROLINA, AND VIRGINIA, AND BELOW THE NORMAL RANGE IN PARTS OF FLORIDA. FLOODING OCCURRED IN PARTS OF ALABAMA, FLORIDA, AND GEORGIA. IN CONTRAST, WATER DEMANDS EXCEEDED SUPPLIES IN SOME PRECIPITATION-SHORT PARTS OF SOUTHERN FLORIDA.

Major flooding occurred in northwestern Florida and the adjacent area of southern Alabama as a result of

rapid runoff from intense rains that exceeded 14 inches at some points in Alabama. Peak discharges at several gaging stations were highest of record and greater than the discharge of a 100-year flood. Selected data on stages, discharges, and gaging-station locations are given on the accompanying table and map. Minor flooding occurred in Suwannee River basin, in northeastern Florida, where peak stages along some reaches of Santa Fe and Withlacoochee Rivers, tributaries of Suwannee River, were 1 to 2 feet higher than flood stage. Urban flooding occurred April 24 in Ocala, in central Florida, as a result of runoff from about 4 inches of rain in 30 minutes. In the west-central part of the State, flow of Peace River at Arcadia (drainage area, 1,367 square miles) continued to decrease and the monthly mean discharge of 63 cfs was only 12 percent of median and the lowest for April since records began in 1931. Also in west-central Florida, daily mean flow of Hillsborough River near Zephyrhills (drainage area, 220 square miles) decreased steadily during the month and the daily mean discharge of 46 cfs at monthend was the lowest observed at that site since records began in 1939. In southeastern Florida, flow of Miami Canal at Miami decreased to zero cfs; flow out of Big Cypress Swamp was zero cfs; and the stage of Lake Okeechobee dropped about 1 foot during



Locations of stream-gaging stations in Florida and Alabama, described in table of peak stages and discharges.

Provisional data; subject to revision

STAGES AND DISCHARGES FOR THE FLOODS OF APRIL 1975 AT SELECTED SITES IN FLORIDA AND ALABAMA

WRD station number	Stream and place of determination	Drainage area (square miles)	Period of known floods	Maximum flood previously known			Maximum during present flood				
				Date	Stage (feet)	Discharge (cfs)	Date	Stage (feet)	Discharge		Recurrence interval (years)
									Cfs	Cfs per square mile	
APALACHICOLA RIVER BASIN											
02359000	Chipola River near Altha, Florida.	781	1912–13, 1921–27, 1929–31, 1943–	Sept. 20, 1926	33.55	25,000	Apr. 16	29.2	13,000	16.6	25
CHOCTAWHATCHEE RIVER BASIN											
02365500	Choctawhatchee River at Caryville, Florida.	3,499	1928–	Mar. 17, 1929	27.1	206,000	13	18.4	88,000	25.2	32
YELLOW RIVER BASIN											
02367500	Lightwood Knot Creek at Babbie, Alabama.	113	1945–	June 4, 1970	11.31	22,200	11	14.7	(a)	.....	>100
02367800	Yellow River near Wing, Alabama.	447	1958–	June 4, 1970	21.10	39,600	11	24.5	(a)	.....	>100
02368000	Yellow River at Milligan, Florida.	624	1938–	Dec. 6, 1953	.....	28,000	12	17.71	38,000	60.9	[b]2.0
ESCAMBIA RIVER BASIN											
02374500	Murder Creek near Evergreen, Alabama.	170	1937–	Feb. 25, 1961	16.13	22,000	10	15.31	17,500	103	50
02374660	Murder Creek near Kirkland, Alabama.	323	1974–	.....	.....	.....	11	24.50	29,000	89.8	50
02375000	Big Escambia Creek at Flomaton, Alabama.	323	1939–	Apr. 15, 1955	19.4	42,400	11	17.92	22,200	68.7	25

[a]Unknown.

[b]Ratio of discharge to that of a 50-year flood.

the month. Water released from Lake Okeechobee and the conservation areas was being delivered to the southeastern coast to maintain water levels in those areas. In southwestern Florida, flow southward through the Tamiami Canal outlets, 40-mile bend to Monroe, remained at zero cfs during the entire month. In the northern part of the State, the discharge of Silver Springs decreased 5 cfs, to 685 cfs; 89 percent of normal.

In south-central Georgia, monthly mean flow of Alapaha River at Statenville, tributary to Suwannee River in the adjacent area of northeastern Florida, increased sharply during the month and was 4 times the median flow for April. Minor flooding occurred along some streams in the southern part of the State, with peak discharges generally equal to those of a 5-year flood.

In northeastern South Carolina, monthly mean flows decreased seasonally but remained in the above-normal range for the 4th and 5th consecutive months, respectively, on Lynches River at Effingham and Pee Dee River at Peedee. In the Midlands and on the coast, rainfall was above normal and streamflow was above the normal range, but in the Piedmont region of the State, although precipitation was below normal, high carryover flows from March held streamflow above normal.

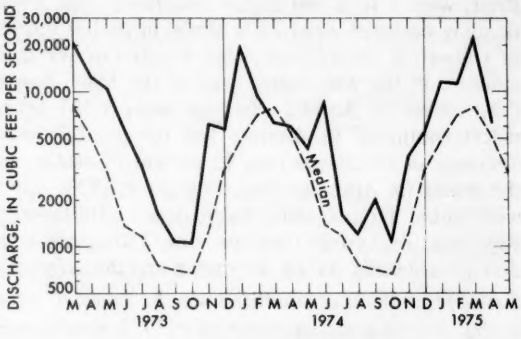
In the Tennessee River basin in western North Carolina, flow of French Broad River at Asheville decreased seasonally but remained above the median flow for the month as a result of runoff from frequent light rains. In the eastern Piedmont and Coastal Plain, monthly mean flow of Neuse River near Clayton decreased sharply, from 330 percent of median in March to 72 percent of the April median flow.

In the Nottaway River basin in southeastern Virginia, high carryover flow from the record-breaking monthly mean discharge of March held flow at the index station near Stony Creek in the above-normal range during April. Elsewhere in the State, flows decreased seasonally and were slightly less than median.

In eastern West Virginia, monthly mean flow of Greenbrier River at Alderson decreased sharply and was less than median for the first month since August 1974. In the Kanawha River basin, where monthly mean discharges at Kanawha Falls in the western part of the State were in the above-normal range for four consecutive months, December 1974 through March 1975, flow decreased sharply in April and was less than median for the first month since February 1974.

In adjacent Kentucky, high carryover flows from March, augmented by runoff from heavy rains April 24, 25, held monthly mean discharges at the index stations, Green River at Munfordville and Licking River at Catawba, in the above-normal range. Cumulative runoff at these two index stations for the first half of 1975 water year was well above the normal range.

In Tennessee, monthly mean flow decreased sharply at all index stations as a result of below-normal rainfall. For the first time in nearly two years, average rainfall over the State was only half of the 30-year normal for a month. High carryover flow from March held monthly mean discharge of Duck River above Hurricane Mills, in west-central Tennessee, above median (see graph).



Monthly mean discharge of Duck River above Hurricane Mills, Tenn. (Drainage area, 2,557 sq mi; 6,623 sq km)

Elsewhere in the State, index-station monthly mean flows also decreased seasonally but were less than median for the first month since August 1974.

In southern Mississippi, high carryover flows from March, augmented by runoff from rains at midmonth, resulted in a monthly mean discharge on Pascagoula River at Merrill that was above the normal range. In central and northern parts of the State, flows also decreased seasonally and remained above median, but were in the normal range.

Ground-water conditions worsened in southern Florida, as precipitation continued far below normal and rates of water use continued to increase. Water-use restrictions were put into effect in some areas. The drought situation is likely to persist until substantial rains occur, normally about mid-June in the Tampa area midway along Florida's Gulf Coast. On April 28, Tampa, dependent in part upon Sulphur Springs for its water supply, called for an immediate voluntary ban on daytime lawn sprinkling. Near Sun City Center (in southwest Hillsborough County, south of Tampa), levels in the Floridan aquifer (artesian) fell to 11.5 feet below sea level, representing a considerable drop in the annual low compared to previous years. Some 60 miles to the south, Sarasota County (which depends upon ground water for public and domestic supplies) also placed limitations on sprinkling; artesian levels were lowest of record in that county in 7 of 12 deep wells. Farther inland, in southern Polk and northern Hardee Counties, the seasonal decline in the Floridan aquifer also reached record lows, as much as 6 feet below the record May lows of 1974 in some wells. Farther south along the Gulf Coast, in the Naples area, levels declined to those that were experienced in the severe drought of 1971. On the east coast of southern Florida, levels approached those

of 1971, but were still somewhat higher than those of that year. In southern Dade County, levels were nearly 3 feet below average and were generally below sea level.

Elsewhere in the Southeast region, ground-water levels rose in extreme eastern and western West Virginia, in the Piedmont and mountains of North Carolina, and in the Sparta Sand and Cockfield Formation in the Jackson area of central Mississippi. Levels declined slightly in the Coastal Plain of North Carolina, and declined also in central West Virginia, most of Kentucky, and Alabama (except for some rises in the southern part). Monthend levels were generally above average in Kentucky (bedrock aquifers), western West Virginia, and in the Piedmont and mountains of North Carolina. Levels were below average in eastern West Virginia and in the Coastal Plain of North Carolina.

WESTERN GREAT LAKES REGION

[Ontario; Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin]

STREAMFLOW INCREASED SEASONALLY THROUGHOUT THE REGION EXCEPT IN OHIO AND PARTS OF ILLINOIS AND INDIANA. FLOWS REMAINED ABOVE THE NORMAL RANGE IN NORTHERN ILLINOIS AND INCREASED INTO THAT RANGE IN PARTS OF ONTARIO, MICHIGAN, MINNESOTA, AND WISCONSIN. SEVERE FLOODING OCCURRED IN SOUTHERN MICHIGAN, AND MINOR FLOODING OCCURRED IN PARTS OF ILLINOIS, INDIANA, MINNESOTA, AND WISCONSIN.

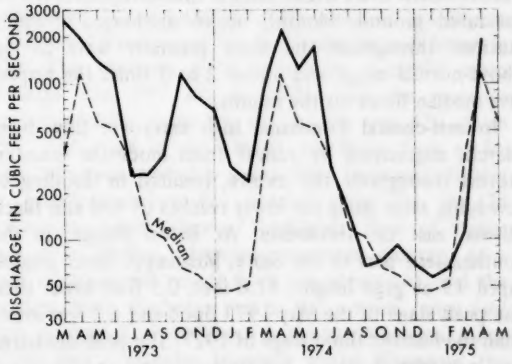
In the southern part of Michigan's Lower Peninsula, rapid runoff from the intense rains of April 18, 19, that fell on saturated soil in Red Cedar and Grand River basins, resulted in severe flooding in the Lansing metropolitan area. The peak discharge of 6,000 cfs, April 20, on Red Cedar River at East Lansing (drainage area, 355 square miles) was greater than that of the most recent major flood, on April 7, 1947, but less than the peak discharge of 8,000 cfs during the historic flood of March 24, 1904. On Grand River at Lansing (drainage area, 1,230 square miles) the peak discharge of 11,000 cfs on April 20 was appreciably less than both the peak discharge of 16,400 cfs on April 7, 1947 and that of 24,500 cfs on March 26, 1904. The monthly mean discharge on Red Cedar River at East Lansing was about 4 times the April median flow. In the adjacent area of southeastern Ontario, monthly mean discharge of Saugeen River near Port Elgin increased sharply from the near-median flow of March and was above the normal range.

In Michigan's Upper Peninsula, the normal seasonal increase in streamflow, resulting from April snowmelt runoff, was severely retarded by below-normal temperatures, and the monthly mean discharge of Sturgeon River near Sidnaw was in the below-normal range for the first month since April 1972. In the adjacent area of southeastern Ontario, below-normal temperatures also delayed snowmelt runoff in the Aux Sables and Missinaibi River basins, resulting in monthly mean discharges in the below-normal range at the respective index stations at Massey and Mattice.

In Pecatonica River basin in north-central Illinois and the adjacent areas of Wisconsin, high carryover flow from March, augmented by snowmelt runoff early in April, held monthly mean discharge at the index station at Freeport, Illinois, in the above-normal range and nearly twice the median discharge for the month. In central and southern parts of Illinois, local flooding resulted from severe thunderstorms near monthend.

In parts of northern and southern Indiana, minor flooding occurred during the last half of the month as a result of runoff from above-normal rains. In western Indiana and the adjacent area of Illinois, monthly mean flow of Wabash River, as measured at Mount Carmel, Illinois, decreased seasonally and was in the normal range. Flow at that site had been above the normal range for 7 consecutive months.

Runoff from delayed snowmelt caused increased flows in upper reaches of Mississippi River late in the month and monthend stages were near, or slightly above, flood stage at several points, including Aitkin and St. Paul, Minnesota, and Prairie du Chien, Wisconsin. Similarly, late-season snowmelt runoff in central Minnesota resulted in sharply increased monthly mean flow in Crow River at Rockford (see graph).



Monthly mean discharge of Crow River at Rockford, Minn. (Drainage area, 2,520 sq mi; 6,530 sq km)

In the area tributary to Mississippi River in northwestern Wisconsin, flow of Jump River at Sheldon also increased sharply and the monthly mean discharge was above the normal range for the first month since December 1973.

In southwestern Ontario, where flow of English River at Umfreville has been in the above-normal range for 10 consecutive months, below-normal temperatures also

delayed the usual seasonal increase in streamflow and monthly mean discharge during April was in the normal range.

Ground-water levels rose in Minnesota (in shallow wells) and Michigan; and changed only slightly in Indiana. Monthend levels were generally above average in Minnesota and most of Michigan; were slightly above average in Indiana; continued to be about average in Ohio; and were below average in the western part of Michigan's Upper Peninsula. In the heavily pumped Minneapolis-St. Paul, Minn., area, artesian levels rose in wells tapping the Prairie du Chien-Jordan aquifer and continued to rise sharply in the deeper Mt. Simon-Hinckley aquifer; levels continued below average in both aquifers.

MIDCONTINENT

[Manitoba and Saskatchewan; Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas]

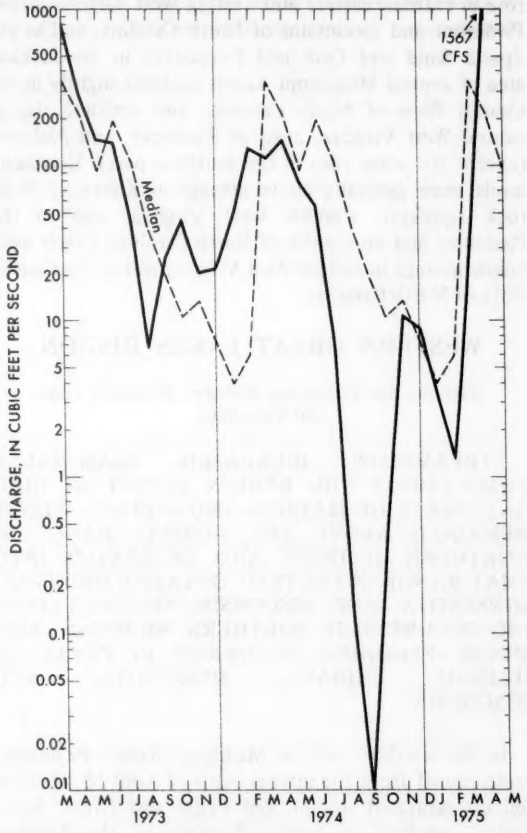
STREAMFLOW GENERALLY INCREASED SEASONALLY IN THE NORTHERN PART OF THE REGION AND DECREASED IN THE SOUTHERN PART. FLOWS REMAINED IN THE ABOVE-NORMAL RANGE IN SOUTH-CENTRAL TEXAS, AND INCREASED INTO THAT RANGE IN PARTS OF NORTH DAKOTA, SOUTH DAKOTA, AND MISSOURI. FLOODING OCCURRED IN IOWA, LOUISIANA, AND MISSOURI.

Minor flooding occurred along some streams in northwestern Iowa where intense thundershowers fell on saturated ground. Monthly mean discharges at index stations throughout the State generally were in the above-normal range and about 2 to 3 times the respective median flows for the month.

In east-central Louisiana, high carryover flow from March, augmented by runoff from moderate thunderstorms throughout the month, resulted in flooding of low-lying areas along the lower reaches of Red and Black Rivers, east of Alexandria. At Baton Rouge, in the southeastern part of the State, Mississippi River crested April 15 at gage height, 41.6 feet, 0.5 foot lower than the peak stage of the May 1973 flood and 6.2 feet lower than the historic flood stage of 1927. The peak discharge of 1,260,000 cfs was about 10 percent less than that for May 1973. Intense rain in the Baton Rouge area April 13, 14, caused local flooding in that city.

In Missouri, bankfull stages, with minor overflow along some streams, occurred in most parts of the State as a result of intense thunderstorms April 23–25. Monthly mean discharge at the index station, Grand River near Gallatin, increased seasonally and was above the normal range.

In North Dakota, streamflow increased as a result of snowmelt runoff and was above the normal range in all parts of the State. At the index station, Cannonball River at Breien, in southwestern North Dakota, flow increased sharply and was about 7 times the median flow for April (see graph). In the eastern part of the State,



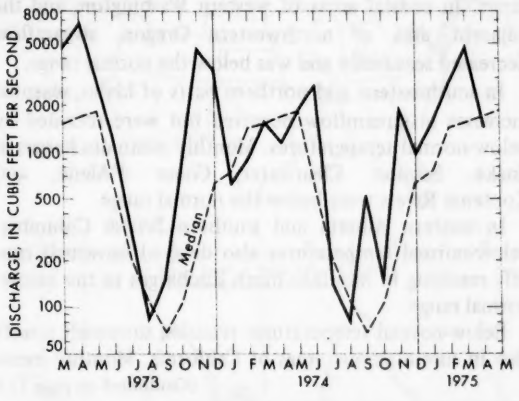
Monthly mean discharge of Cannonball River at Breien, N. Dak. (Drainage area, 4,100 sq mi; 10,600 sq km)

and the adjacent area of Minnesota, flow of Red River of the North, as measured at Grand Forks, North Dakota, also increased sharply, and was twice the median for the month. In north-central North Dakota, Souris River at Minot was above National Weather Service flood stage and rising slowly at monthend, but was below the top of the levees.

In central South Dakota, where flow at the index station, Bad River near Fort Pierre, was only 14 percent of median during March, flow increased sharply and was about 9 times median in April. In the eastern part of the State, monthly mean discharge of Big Sioux River, as measured at Akron, Iowa, also increased sharply, from 18 percent of median in March to 124 percent of the median flow for April.

In Arkansas, Kansas, Oklahoma, and southern Missouri, streamflow decreased at all index stations but monthly mean discharges were near, or above, the

median flows for the month. In northern Arkansas, flow of Buffalo River near St. Joe decreased sharply from about 3 times median in March to near median in April (see graph).



Monthly mean discharge of Buffalo River near St. Joe, Ark. (Drainage area, 829 sq mi; 2,147 sq km)

In central Texas, monthly mean flows were in the above-normal range in small parts of the Brazos and Guadalupe River basins, and were below the normal range in the North Concho River basin. Elsewhere in the State, flows were in the normal range and greater than median.

In south-central Manitoba, where flow of Waterhen River below Waterhen Lake was above the normal range for the past 11 consecutive months, monthly mean discharge increased seasonally but was in the normal range. The level of Lake Winnipeg at Gimli averaged 716.31 feet above mean sea level, which is the highest of record for April, 0.27 foot higher than the previous maximum mean for the month (1971), 3.28 feet higher than the April long-term mean, and 0.05 foot higher than last month.

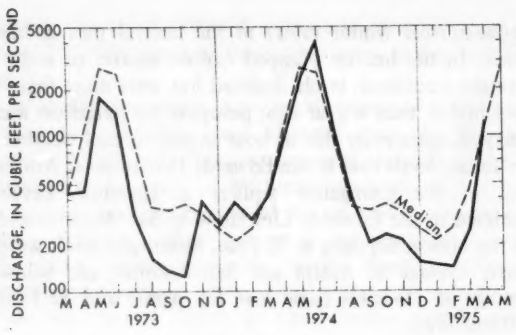
Ground-water levels rose in the northern part of the region (N. Dak., S. Dak., Iowa, and Nebr.); and changed only slightly in Kansas. Monthend levels in North Dakota were at or above average for the first time in almost a year. In Iowa, too, levels in water-table wells were above average. Levels in Nebraska were slightly below average, except for continued, much-below-average levels in heavily pumped areas. In the Grand Prairie, rice-growing area of east-central Arkansas, the level in the shallow aquifer declined slightly and was near average, and the level in the deep aquifer rose 1½ feet and was 6 feet below average. In the industrial aquifer (Sparta Sand) of central and southern Arkansas, the level at Pine Bluff declined and equaled the previous lowest-of-record for April, and the level at El Dorado declined slightly but remained above average. In Louisiana, levels generally declined except for rises in the terrace deposits (because of recharge from above-normal winter rains) in the central part of the State. In the heavily pumped Chicot aquifer of southwestern Louisiana, levels declined but were more than 6 feet higher than a year ago; pumping for irrigation was delayed, apparently due at least in part to cool weather. In Texas, levels rose in the Edwards Limestone at Austin and in the Evangeline aquifer at Houston. Levels declined in the Edwards Limestone at San Antonio and in the bolson deposits at El Paso. Monthend levels were above average at Austin and San Antonio, and below average at Houston (new low for April) and El Paso (alltime low).

WEST

[Alberta and British Columbia; Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming]

STREAMFLOW GENERALLY INCREASED EXCEPT IN THE COASTAL STATES, AND ON VANCOUVER ISLAND IN WESTERN BRITISH COLUMBIA. FLOWS REMAINED IN THE BELOW-NORMAL RANGE IN A LARGE AREA IN THE NORTHERN PART OF THE REGION, AND IN SMALLER AREAS IN THE CENTRAL PART. RECORD-LOW DISCHARGES OCCURRED AT SEVERAL INDEX STATIONS WHERE SNOWMELT RUNOFF WAS RETARDED BY BELOW-NORMAL TEMPERATURES.

On Middle Fork Flathead River near West Glacier (drainage area, 1,128 square miles) in northern Montana, west of the Continental Divide, the monthly mean discharge of 722 cfs, and the daily mean of 316 cfs (on several days) were lowest for April since records began in 1939. The previous April record-low monthly mean discharge was 997 cfs in 1970, and the previous record-low daily mean for the month was 426 cfs in 1955. Also west of the Divide, on Clark Fork at St. Regis, Montana, monthly mean flow increased slightly but remained below the normal range for the 3d consecutive month. East of the Divide, flow of Marias River near Shelby, Montana, increased sharply, as a result of snowmelt runoff from low elevations, and the monthly mean discharge was in the normal range (see graph on page 8). It had been in the below-normal range for the past 7 months. In north-central Wyoming, the monthly mean discharge of 41.3 cfs on Tongue River near Dayton (drainage area, 204 square miles) was lowest for April in 46 years of record, and in north-central Utah, the monthly mean discharge of 64.6 cfs on Weber River near Oakley (drainage area, 163 square miles) was lowest for the month since records began in October 1904. In the southwestern part of Utah, the monthly mean discharge of 17.5 cfs, and the daily mean of 15 cfs, April 10–13, on Beaver River near Beaver (drainage area, 82 square miles) were lowest for April in 61 years of record.



Marias River near Shelby, Mont. (Drainage area, 3,242 sq mi; 8,397 sq km)

In northwestern Washington, the monthly mean flow of 2,026 cfs on Skykomish River near Gold Bar (drainage area, 535 square miles) was the 2d lowest for April since records began in September 1928, exceeded only by the mean discharge of 1,955 cfs in April 1967. In eastern Washington, and the adjacent area of northern Idaho, monthly mean flow of Spokane River, as measured at Spokane, Washington, increased slightly but was only 52 percent of median and in the below-normal range. In coastal areas of western Washington, and the adjacent area of northwestern Oregon, streamflow decreased seasonally and was below the normal range.

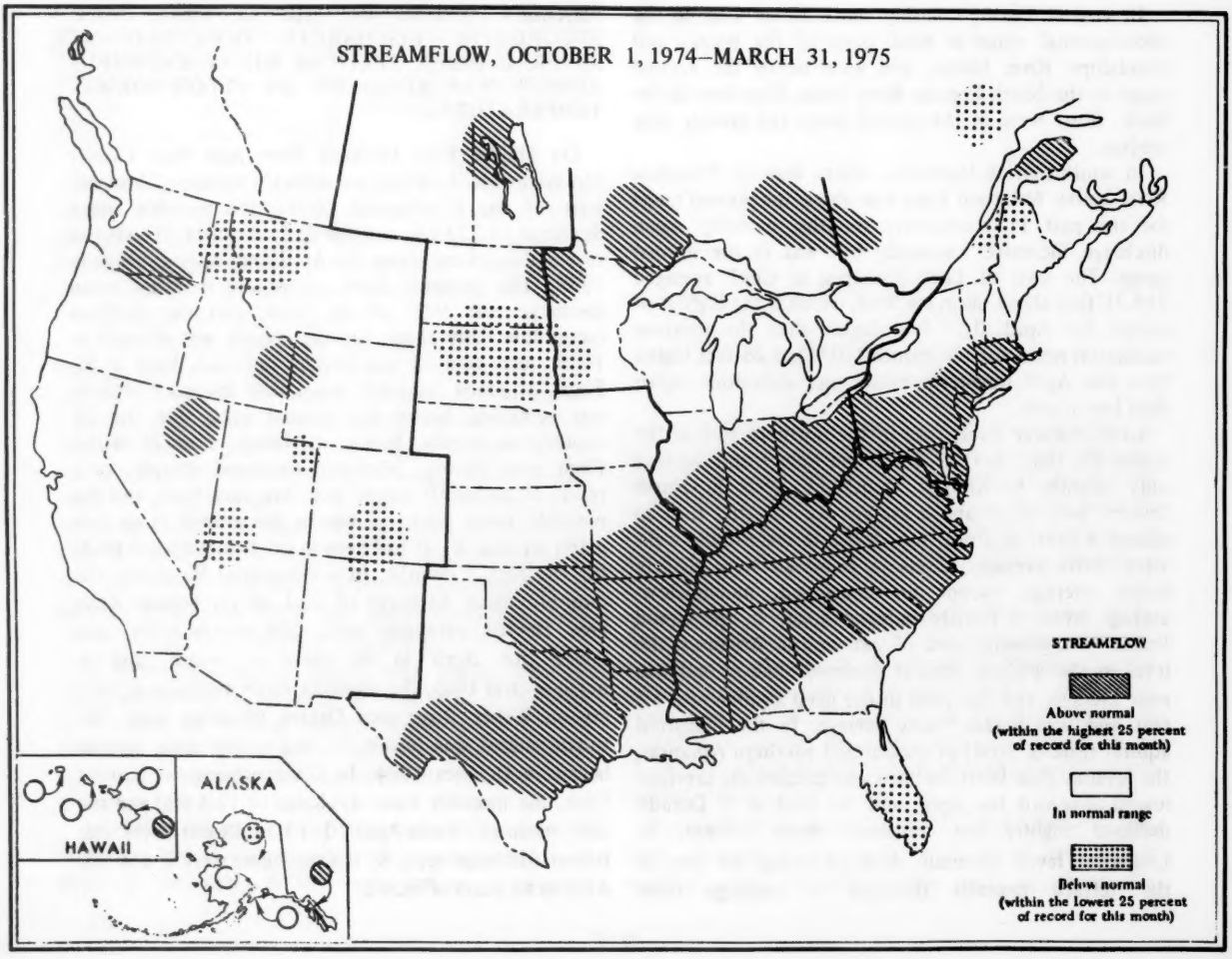
In southeastern and northern parts of Idaho, seasonal increases in streamflow occurred but were retarded by below-normal temperatures. Monthly mean discharges in Snake, Salmon, Clearwater, Coeur d'Alene, and Kootenai Rivers were below the normal range.

In western Alberta and southern British Columbia, below-normal temperatures also delayed snowmelt runoff, resulting in monthly mean discharges in the below-normal range.

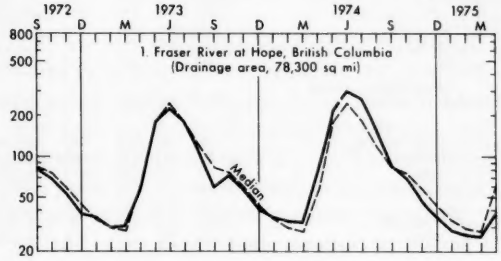
Below-normal temperatures retarded snowmelt runoff also in mountainous areas of California. Monthly mean

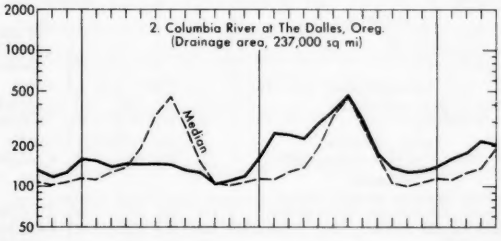
(Continued on page 11.)

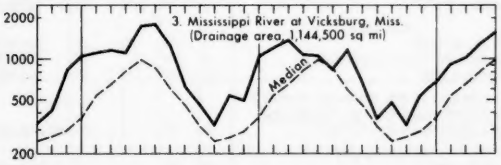
SUPPLEMENTAL DATA FOR SIX-MONTH PERIOD ENDING MARCH 31, 1975

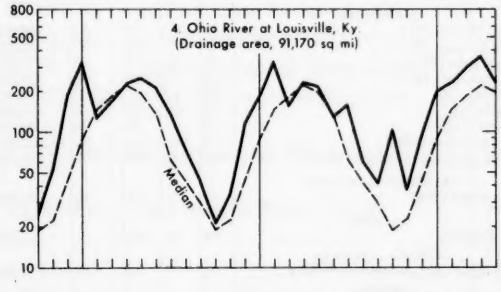

STREAMFLOW, OCTOBER 1, 1974–MARCH 31, 1975
ALASKA
HAWAII
STREAMFLOW
Above normal
(within the highest 25 percent of record for this month)
In normal range
Below normal
(within the lowest 25 percent of record for this month)

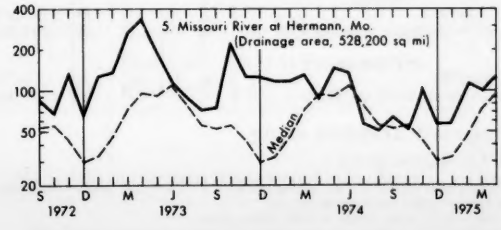
HYDROGRAPHS OF SOME LARGE RIVERS, SEPTEMBER 1972 TO APRIL 1975



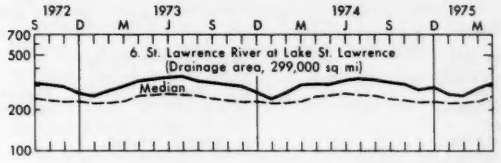


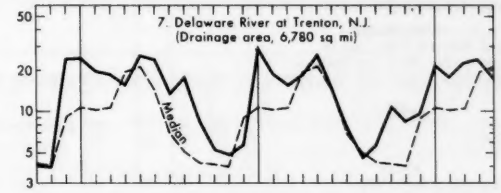


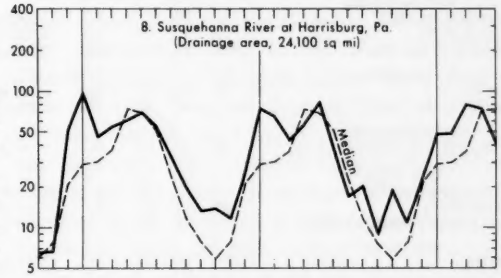


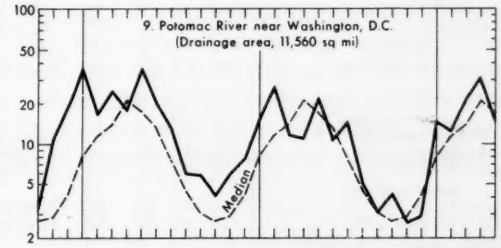


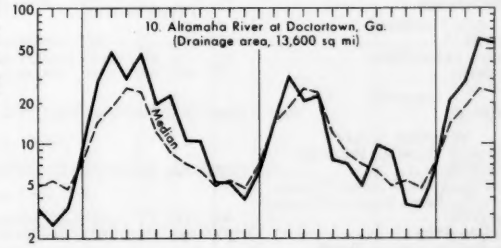
DISCHARGE, IN THOUSANDS OF CUBIC FEET PER SECOND

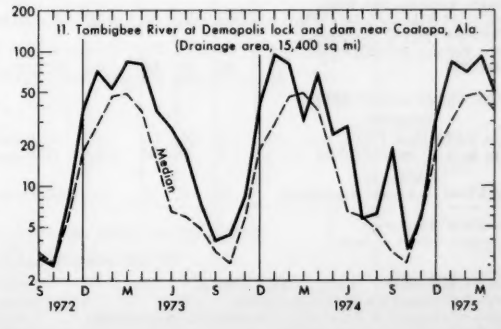












USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF APRIL 1975

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of Mar. 1975	End of Apr. 1975	End of Apr. 1974	Average for end of Apr.	Normal maximum
	Percent of normal maximum				
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	44	63	86	76	223,400 (a)
QUEBEC					
Gouin (P)	53	53	54	46	6,954,000 ac-ft
Allard (P)	23	49	100	79	280,600 ac-ft
MAINE					
Seven reservoir systems (MP)	32	47	95	65	178,489 mcf
NEW HAMPSHIRE					
Lake Winnipesaukee (PR)	67	93	101	97	7,200 mcf
Lake Francis (FPR)	19	31	83	53	4,326 mcf
First Connecticut Lake (P)	5	17	74	48	3,330 mcf
VERMONT					
Somerset (P)	62	68	84	74	2,500 mcf
Harriman (P)	32	62	87	77	5,060 mcf
MASSACHUSETTS					
...bble Mountain and Borden Brook (MP)	82	89	87	89	3,394 mcf
NEW YORK					
...t Sacandaga Lake (FPR)	52	90	100	90	34,270 mcf
...an Lake (FMP)	49	62	86	91	4,500 mcf
...ew York City reservoir system (MW)	99	99	98	.....	547,500 mg
NEW JERSEY					
Wanaque (M)	101	99	99	94	27,730 mg
PENNSYLVANIA					
Wallenpaupack (P)	66	74	73	79	6,875 mcf
Pymatuning (FMR)	98	96	98	98	8,191 mcf
MARYLAND					
Baltimore municipal system (M)	100	100	100	94	85,340 mg
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	103	95	96	93	12,580 mcf
High Rock Lake (P)	100	81	86	85	10,230 mcf
Narrows (Badin Lake) (P)	98	99	97	102	5,616 mcf
SOUTH CAROLINA					
Lake Murray (P)	93	91	92	81	70,300 mcf
Lakes Marion and Moultrie (P)	93	85	86	80	81,100 mcf
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	82	77	77	75	75,360 mcf
GEORGIA					
Burton (PR)	90	96	99	92	104,000 ac-ft
Lake Sidney Lanier (FMPR)	68	65	67	63	1,686,000 ac-ft
Sinclair (MPR)	97	92	88	92	214,000 ac-ft
ALABAMA					
Lake Martin (P)	100	99	95	95	1,373,000 ac-ft
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	79	73	63	61	1,156,000 cfsd
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	84	83	79	66	1,452,000 cfsd
Douglas Lake (FPR)	73	66	67	61	703,100 cfsd
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	84	86	83	77	512,200 cfsd
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	88	86	86	77	745,200 cfsd
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	30	65	65	69	15,900 mcf
Wisconsin River (21 reservoirs) (PR)	8	60	70	70	17,400 mcf
MINNESOTA					
Mississippi River headwater system (FMR)	20	40	37	31	1,640,000 ac-ft
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	83	88	85	.....	22,640,000 ac-ft
NEBRASKA					
Lake McConaughy (IP)	82	84	82	78	1,948,000 ac-ft
OKLAHOMA					
Keystone (FPR)	106	99	109	120	661,000 ac-ft
Lake O' The Cherokees (FPR)	105	94	87	91	1,492,000 ac-ft
Tenkiller Ferry (FPR)	108	103	109	96	628,200 ac-ft
Lake Altus (FIMR)	61	67	55	54	134,500 ac-ft
Eufaula (FPR)	98	102	98	90	2,378,000 ac-ft
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	103	99	102	91	2,722,000 ac-ft
TEXAS					
Possum Kingdom (IMPRW)	89	90	82	98	569,400 ac-ft
Buchanan (IMPW)	98	96	83	80	955,200 ac-ft
Bridgeport (IMW)	67	71	53	47	386,400 ac-ft
Eagle Mountain (IMW)	98	100	94	89	190,300 ac-ft
Medina Lake (I)	100	100	95	50	254,000 ac-ft
Lake Travis (FIMPRW)	100	100	95	78	1,144,000 ac-ft
Lake Kemp (IMW)	49	50	47	89	268,000 ac-ft
THE WEST					
ALBERTA					
Spray (P)	.....	.....	.....	.....	210,000 ac-ft
Lake Minnewanka (P)	.....	.....	.....	.....	199,700 ac-ft
St. Mary (I)	.....	.....	.....	70	320,800 ac-ft
WASHINGTON					
Franklin D. Roosevelt Lake (IP)	31	8	0	48	5,232,000 ac-ft
Lake Chelan (PR)	8	12	27	40	676,100 ac-ft
IDAHO--WYOMING					
Upper Snake River (7 reservoirs) (IMP)	71	61	60	78	4,282,000 ac-ft
WYOMING					
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	66	69	69	48	3,056,200 ac-ft
Buffalo Bill (IP)	60	56	42	61	421,300 ac-ft
Boysen (FIP)	68	64	68	58	802,000 ac-ft
Keyhole (F)	71	74	84	41	199,900 ac-ft
COLORADO					
John Martin (FIR)	2	0	0	16	364,400 ac-ft
Colorado–Big Thompson project (I)	69	69	82	57	722,600 ac-ft
Taylor Park (IR)	47	47	61	58	106,200 ac-ft
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Navajo, and Blue Mesa Reservoirs (IFPR)	69	70	72	.....	31,276,500 ac-ft
UTAH--IDAHO					
Bear Lake (IPR)	78	80	81	62	1,421,000 ac-ft
CALIFORNIA					
Hetch Hetchy (MP)	17	12	48	37	360,400 ac-ft
Lake Almanor (P)	87	85	105	50	1,036,000 ac-ft
Shasta Lake (FIPR)	91	101	99	92	4,377,000 ac-ft
Millerton Lake (FI)	65	75	89	68	503,200 ac-ft
Pine Flat (FI)	58	57	83	60	1,014,000 ac-ft
Isabella (FIR)	38	39	51	28	551,800 ac-ft
Folsom (FIP)	72	67	76	74	1,000,000 ac-ft
Lake Berryessa (FIMW)	102	101	101	90	1,600,000 ac-ft
Clair Engle Lake (Lewiston) (P)	88	88	98	91	2,438,000 ac-ft
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	75	75	84	60	744,600 ac-ft
NEVADA					
Rye Patch (I)	84	83	106	.....	157,200 ac-ft
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	76	75	74	63	27,970,000 ac-ft
ARIZONA					
San Carlos (IP)	22	23	47	18	1,093,000 ac-ft
Salt and Verde River system (IMPR)	60	70	71	49	2,073,000 ac-ft
NEW MEXICO					
Conchas (FIR)	38	38	64	76	352,600 ac-ft
Elephant Butte and Caballo (FIPR)	19	17	31	27	2,539,000 ac-ft

[a]Thousands of kilowatt-hours

METRIC EQUIVALENTS OF UNITS USED IN THE WATER RESOURCES REVIEW

(Round-number conversions, to nearest four significant figures)

1 foot = 0.3048 metre 1 mile = 1.609 kilometres
1 acre = 0.4047 hectare = 4,047 square metres
1 square mile (sq mi) = 259 hectares = 2.59 square kilometres (sq km)
1 acre-foot (ac-ft) = 1,233 cubic metres
1 million cubic feet (mcf) = 28,320 cubic metres

1 cubic foot per second (cfs) = 0.02832 cubic metres per second = 1.699 cubic metres per minute
1 second-foot-day (cfsd) = 2,447 cubic metres per day
1 million gallons (mg) = 3,785 cubic metres = 3.785 million litres
1 million gallons per day (mgd) = 694.4 gallons per minute (gpm) = 2.629 cubic metres per minute = 3,785 cubic metres per day

(Continued from page 8.)
flow of Kings River above North Fork, in the central Sierra Nevada, increased slightly but was below the normal range. In the northern part of the State, flows at the index stations, North Fork American River at North Fork Dam, and Smith River near Crescent City, decreased and were below median for the month.

In Colorado, east of the Continental Divide, monthly mean flow of Arkansas River at Canon City increased seasonally and was above the normal range, but west of the Divide, monthly mean flows of Roaring Fork River at Glenwood Springs and Yampa River at Steamboat Springs, also increased seasonally but were below the normal range. At Steamboat Springs, the daily mean discharge of 75 cfs, April 4, was lowest for the month in 68 years of record.

In southwestern New Mexico, monthly mean flow of Gila River near Gila increased contraseasonally, was 3

(Continued on page 17.)

INDEX STATIONS AND SELECTED LARGE-RIVER STREAM-GAGING STATIONS IN THE WEST

(Alberta and British Columbia; Ariz., Calif., Colo., Idaho, Mont., Nev., N. Mex., Oreg., Utah, Wash., and Wyo.)

Streamflow conditions as described each month in the Water Resources Review, including the front-page map, are based primarily on data from "index" and selected large-river stations--stream-measurement sites with long periods of record and typical of surface-water conditions in a particular Province, State, or region. Flows at index stations represent relatively natural conditions; that is, generally free of man-made controls or effects such as upstream dams and diversions. Flows at large-river stations may be affected markedly by upstream reservoir controls (storage or releases) and/or upstream diversions such as for irrigation. Stations selected for the "large-river" category have either large drainage areas or large flows, usually both.

In the West there are 45 index stations and 10 large-river stations, including 3 stations that represent both categories. The locations and means and extremes of flow at these 52 stations are shown on the accompanying map and table.

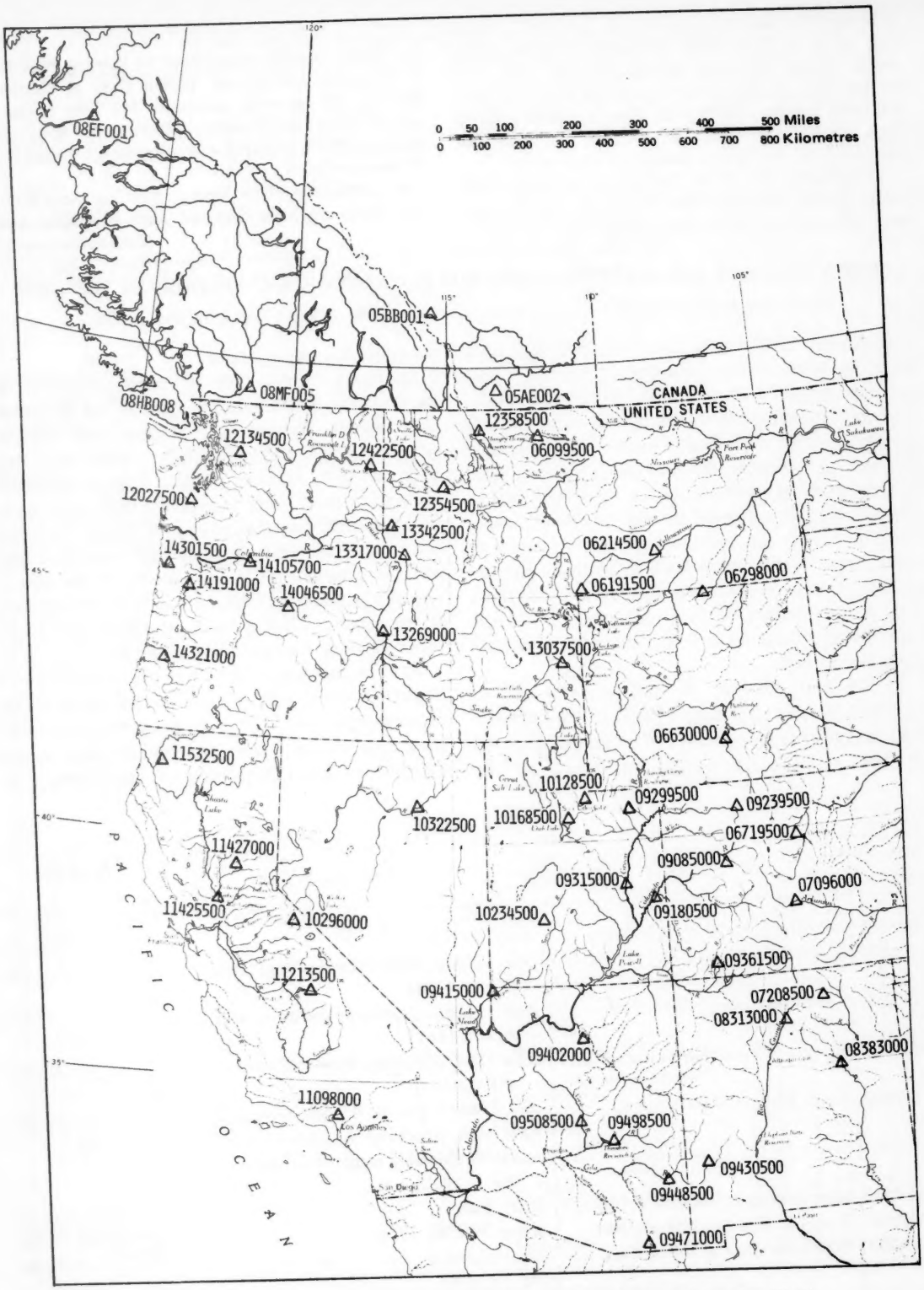
Seasonally highest flows in many streams in the Pacific Coast States normally occur during the winter rainy season. Elsewhere in the West and including Alberta and British Columbia, highest flows occur most often in April, May, or June, a time of substantial meltwater runoff from snow and runoff from spring rain. Seasonally lowest flows in many parts of the region occur most commonly in summer or autumn, a time when snowmelt runoff (if any) is minimal and rates of evapotranspiration are high. Lowest flows in some parts of the region, including much of Alberta and British Columbia, occur during the winter months.

In some instances, extreme high or low discharges (or stages), on dates prior to those in the accompanying two-page table, exceed the extremes shown in the table. These data are given below for 9 stations; the first item is a minimum flow, the others are maximum flows.

Station number	Station	Date or month	Discharge (cfs)
09498500	Salt River near Roosevelt, Ariz	Aug. 5, 1911	About 42
09508500	Verde River below Tangle Creek, above Horseshoe Dam, Ariz.	Mar. 3, 1938 [Maximum discharge since at least 1924]	100,000
06719500	Clear Creek near Golden, Colo	Aug. 1, 1888 [Maximum discharge since at least 1867]	8,700
13037500	Snake River near Heise, Idaho	June 1894 [Discharge estimated by Corps of Engineers]	65,000
13269000	Snake River at Weiser, Idaho	Mar. 3, 1910 [At site 0.3 mile upstream]	120,000
		June 1894 [Discharge not known; peak stage was considerably higher than that of Mar. 3, 1910]	.....
13317000	Salmon River at White Bird, Idaho..	June 1894	120,000
10322500	Humboldt River at Palisade, Nev...	About Feb. 28, 1910	About 17,000
14191000	Willamette River at Salem, Oreg ...	Dec. 4, 1861	500,000
		[a]Jan. 16, 1881	[a]428,000
		[a]Feb. 5, 1890	[a]448,000
09180500	Colorado River near Cisco, Utah ...	[b]July 4, 1884	[b]About 125,000

[a]From information furnished by Corps of Engineers.

[b]From flood record at Fruita, Colo.



Location of selected stream-gaging stations in the West region described in table on pages 13, 14.

Index and large-river stream-gaging stations, West region, used in preparation of the Water Resources Review

Name of index (In) and large-river (LR) gaging station (listed by Provinces and States, and then alphabetically by rivers)	Station number	Drainage area, in sq mi (sq km)	Stream discharge				
			Period of record through 1972				1941–70
			Period, in years (total years of record)	Maximum, in cfs; date	Minimum, in cfs; date	Mean, in cfs (m^3/s)	Median, in cfs (m^3/s)
CANADA							
Bow River at Banff, Alberta. (In)	05BB001	858 (2,222)	1909– (62)	14,100 June 14, 1923	[a]128 Jan. 5, 1932	[b]1,420 (40)	[b]1,400 (40)
Lee Creek at Cardston, Alberta. (In)	05AE002	117 (303)	1909–14, 1920– (52)	11,400 June 8, 1964	[a]0 Feb. 18, 1936	[b]62.9 (1.8)	[b]62.6 (1.8)
Fraser River at Hope, British Columbia. (In, LR)	08MF005	78,300 (202,797)	1912– (60)	[c]536,000 May 31, 1948	[a]12,000 Jan. 8, 1916	[b]96,300 (2,727)	[b]98,400 (2,787)
Skeena River at Usk, British Columbia. (In)	08EF001	16,300 (42,217)	1928–31, 1936– (30)	[c]330,000 May 26, 1948	[a]1,830 Mar. 1, 1950	[b]32,600 (923)	[b]33,700 (954) [23 years]
Sproat River near Alberni, British Columiba. (In)	08HB008	134 (347)	1913–31, 1939, 1941– (48)	[c]12,900 Jan. 20, 1968	[a]38.0 Oct. 7, 1963	[b]1,330 (38)	[b]1,320 (37)
UNITED STATES							
Gila River at head of Safford Valley, near Solomon, Ariz. (In)	09448500	7,896 (20,451)	1914– (58)	100,000 Jan. 19, 1916	11 June 25, 1956	432 (12)	244 (6.9)
Little Colorado River near Cameron, Ariz. (In)	09402000	26,500 (68,600)	1947– (25)	24,900 Jan. 21, 1952	[d]0	200 (5.7)	228 (6.5)
Salt River near Roosevelt, Ariz. (In)	09498500	4,306 (11,153)	1913– (59)	117,000 Mar. 14, 1941	59 July 1–4, 7–12, 1955	822 (23)	504 (14)
San Pedro River at Charleston, Ariz. (In)	09471000	1,219 (3,157)	1912– (61)	98,000 Sept. 28, 1926	[e]0.5 July 6, 1966, July 11, 1971	61.1 (1.7)	41.3 (1.2)
Verde River below Tangle Creek, above Horseshoe Dam, Airz. (In)	09508500	5,872 (15,208)	1945– (27)	81,600 Dec. 31, 1951	[f]48 June 17, 1956, July 18, 19, 1958	437 (12)	399 (11)
Virgin River at Littlefield, Ariz. (In)	09415000	5,090 (13,180)	1929– (43)	35,200 Dec. 6, 1966	39 Aug. 4, 6, 9, 1966	223 (6.3)	177 (5.0)
Arroyo Seco near Pasadena, Calif. (In)	11098000	16.0 (41.4)	1910– (58)	8,620 Mar. 2, 1938	[g]0	9.43 (0.27)	3.8 (0.11)
Kings River above North Fork, near Trimmer, Calif. (In)	11213500	952 (2,466)	1926–28, 1931– (43)	59,100 Dec. 23, 1955	[a]70 Jan. 14, 1963	1,419 (40)	1,178 (33)
North Fork American River at North Fork Dam, Calif. (In)	11427000	342 (886)	1941– (31)	65,400 Dec. 23, 1964	[h]0 Aug. 27–30, Sept. 2–11, 1944, Oct. 5, 6, 1963, Nov. 7–10, 1965	822 (23)	742 (21)
Sacramento River at Verona, Calif. (LR)	11425500	21,257 (55,056)	1926– (43)	79,200 Mar. 1, 1940	[a]304 July 23, 24, 1931	18,510 (524)	17,680 (501)
Smith River near Crescent City, Calif. (In)	11532500	609 (1,577)	1931– (41)	228,000 Dec. 22, 1964	[a]160 Oct. 24, 25, 1964	3,846 (109)	3,850 (109)
West Walker River below Little Walker River, near Coleville, Calif. (In)	10296000	180 (466)	1938– (34)	6,220 Nov. 20, 1950	[i]4.0 Nov. 18, 1948	258 (7.3)	246 (7.0)
Animas River at Durango, Colo. (In)	09361500	692 (1,792)	[j]1895–1911, 1912– (67)	25,000 Oct. 5, 1911	[a]94 Mar. 2, 1913	839 (24)	758 (21)
Arkansas River at Canon City, Colo. (In)	07096000	3,117 (8,073)	1888– (84)	19,000 Aug. 2, 1921	[a]69 May 13, 1959	721 (20)	696 (20)
Clear Creek near Golden, Colo. (In)	06719500	399 (1,033)	1908–09, 1911– (62)	5,890 Sept. 9, 1933	[a]10 Mar. 4, 1966	228 (6.5)	216 (6.1)
Roaring Fork River at Glenwood Springs, Colo. (In)	09085000	1,451 (3,758)	1905– (66)	19,000 July 1, 1957	145 Jan. 21, 1935	1,364 (39)	1,164 (33)
Yampa River at Steamboat Springs, Colo. (In)	09239500	604 (1,564)	1904–06, 1909– (65)	6,820 June 14, 1921	[a]4.0 Sept. 8, 1934 Sept. 10–13, 1944	466 (13)	422 (12)
Clearwater River at Spalding, Idaho. (LR)	13342500	9,570 (24,790)	1910–13, 1924– (50)	177,000 May 29, 1948	[a]500 Jan. 9, 1937, Dec. 1, 1952	15,520 (440)	15,400 (436)
Salmon River at White Bird, Idaho. (In, LR)	13317000	13,550 (35,090)	1910–17, 1919– (60)	106,000 May 24, 1956	1,580 Dec. 11, 1932	11,220 (318)	12,140 (344)
Snake River near Heise, Idaho. (In)	13037500	5,752 (14,898)	1910– (62)	[k]60,000 May 19, 1927	460 Nov. 10, 12, 1956	6,901 (195)	6,534 (185)

Index and large-river stream-gaging stations, West region, used in preparation of the Water Resources Review--Continued

Name of index (In) and large-river (LR) gaging station (listed by Provinces and States, and then alphabetically by rivers)	Station number	Drainage area, in sq mi (sq km)	Stream discharge				
			Period of record through 1972				1941–70
			Period, in years (total years of record)	Maximum, in cfs; date	Minimum, in cfs; date	Mean, in cfs (m^3/s)	Median, in cfs (m^3/s)
Snake River at Weiser, Idaho. (LR)	13269000	69,200 (179,230)	1910– (62)	84,500 Apr. 29, 1952	5,100 Aug. 5, 1924	18,010 (510)	16,860 (477)
Clark Fork at St. Regis, Mont. (In.)	12354500	10,709 (27,736)	1910– (62)	68,900 May 24, 1948	[l]1,000 Dec. 17, 1940	7,556 (214)	7,660 (217)
Marias River near Shelby, Mont. (In)	06099500	3,242 (8,397)	1902–08, 1911– (64)	[m]241,000 June 9, 1964	10 Aug. 20, 1919	956 (27)	978 (28)
Middle Fork Flathead River near West Glacier, Mont. (In)	12358500	1,128 (2,922)	1939– (33)	140,000 June 9, 1964	<173 Nov. 27, 1952	2,964 (84)	2,894 (82)
Yellowstone River at Billings, Mont. (LR)	06214500	11,795 (30,549)	1904–05, 1928– (44)	66,100 June 16, 1967	430 Dec. 12, 1932	6,858 (194)	7,511 (213)
Yellowstone River at Corwin Springs, Mont. (In)	06191500	2,623 (6,794)	1889–93, 1910– (66)	32,000 June 14, 15, 1918	389 Feb. 23, Mar. 5, 9, 1937	3,108 (88)	3,191 (90)
Humboldt River at Palisade, Nev. (In)	10322500	5,010 (12,980)	1902–06, 1911– (65)	6,610 Feb. 12, 1962	2 Aug. 25–28, 1931	364 (10)	382 (11)
Gila River near Gila, N.Mex. (In)	09430500	1,864 (4,828)	1914, 1927– [b](45)	25,400 Sept. 29, 1941	14 July 15, 1971	[b]130 (3.7)	85.2 (2.4)
Pecos River at Santa Rosa, N.Mex. (In)	08383000	2,650 (6,864)	1906, 1910–24, 1927– [b](58)	[n]55,200 June 2, 1937	0.28 Jan. 7, 1971	[b]139 (3.9)	84.7 (2.4)
Rayado Creek at Sauble Ranch, near Cimarron, N.Mex. (In)	07208500	65 (168)	1909–20, 1923–24, 1927– [b](53)	9,000 June 17, 1965	0.03 Dec. 3, 1950	[b]13.9 (0.39)	11.0 (0.31)
Rio Grande at Otowi Bridge, near San Ildefonso, N.Mex. (In, LR)	08313000	14,300 (37,037)	1895–1905, 1909– [b](73)	[o]24,400 May 23, 1920	[a]60 July 4, 5, 1902	[b]1,507 (43)	1,155 (33)
Columbia River at The Dalles, Oreg. (LR)	14105700	237,000 (614,000)	1857– (94)	1,240,000 June 6, 1894	[P]12,100 Apr. 16, 1968	194,900 (5,520)	190,200 (5,390)
John Day River at Service Creek, Oreg. (In)	14046500	5,090 (13,200)	1925–26, 1929– (44)	40,200 Dec. 23, 1964	20 Sept. 6, 1931	1,819 (52)	1,986 (56)
Umpqua River near Elkton, Oreg. (In)	14321000	3,683 (9,539)	1950– (67)	265,000 Dec. 23, 1964	640 July 18, 1926	7,529 (213)	7,490 (212)
Willamette River at Salem, Oreg. (LR)	14191000	7,280 (18,900)	1909–16, 1923– (56)	348,000 Jan. 8, 1923	2,470 Aug. 27, 1940	23,690 (671)	24,180 (685)
Wilson River near Tillamook, Oreg. (In)	14301500	161 (417)	1914–16, 1931– (42)	36,000 Jan. 20, 1972	34 Sept. 1–5, 18–22, 1967	1,224 (35)	1,191 (34)
Beaver River near Beaver, Utah. (In)	10234500	82 (212)	1906, 1914– (58)	1,080 July 22, 1936	[a]9.7 Feb. 11, 1964	51.0 (1.4)	47.4 (1.3)
Big Cottonwood Creek near Salt Lake City, Utah. (In)	10168500	48.5 (126)	1898– (74)	[c]835 June 6, 1909	[a]4.5 Jan. 10, 1937	73.3 (2.1)	71.4 (2.0)
Colorado River near Cisco, Utah. (In)	09180500	24,100 (62,420)	1895– (61)	76,800 June 19, 1917	558 July 31, 1934	7,666 (217)	6,212 (176)
Green River at Green River, Utah. (LR)	09315000	40,600 (105,200)	1894–99, 1904– (73)	68,100 June 27, 1917	255 Nov. 26, 1931	6,347 (180)	5,878 (166)
Weber River near Oakley, Utah. (In)	10128500	163 (422)	1904– (68)	4,170 June 13, 1921	16 Mar. 12, 1941	221 (6.2)	208 (5.9)
Whiterocks River near Whiterocks, Utah. (In)	09299500	113 (293)	1899–1903, 1907–10, 1913– (65)	2,750 June 20, 21, 1922	10 Dec. 5, 1933	125 (3.5)	116 (3.3)
Chehalis River near Grand Mound, Wash. (In)	12027500	895 (2,318)	1928– (44)	49,200 Jan. 21, 1972	82 Aug. 30, 1967	2,849 (81)	2,764 (78)
Skykomish River near Gold Bar, Wash. (In)	12134500	535 (1,386)	1928– (44)	88,700 Dec. 21, 1933	315 Nov. 29, 1952	3,983 (113)	4,103 (116)
Spokane River at Spokane, Wash. (In)	12422500	4,290 (11,100)	1891– (81)	49,000 May 31, 1894	95 Sept. 19, 1956	6,904 (196)	7,108 (201)
North Platte River above Seminoe Reservoir, near Sinclair, Wyo. (In)	06630000	8,134 (21,067)	1939– (33)	14,500 June 15, 1957	[a]70 Sept. 17, 1944	1,084 (31)	1,062 (30)
Tongue River near Dayton, Wyo. (In)	06298000	204 (528)	1918–29, 1940– (43)	3,400 June 3, 1944	[a]18 Nov. 29, 1919	187 (5.3)	178 (5.0)

Note: Multiply cfs by 0.02832 to convert to m^3/s (cubic metres per second).
[a] Minimum daily.
[b] Calendar years.
[c] Maximum daily.
[d] No flow at times in each year.
[e] Minimum since 1928.
[f] Result of power regulation on Fossil Creek.
[g] No flow at times in some years.
[h] Caused by operation of valve in North Fork Dam.
[i] Result of freezeup.
[j] Record incomplete for parts of some years prior to 1912.
[k] Result of washing out of landslide on Gros Ventre River.
[l] May have been less during periods of ice effect in several years.
[m] Largely the result of failure of Swift Dam.
[n] Greatest since at least 1886.
[o] Greatest since at least 1884 and probably since 1741; information from W.H. Yeo's file on floods.
[P] 1878–1972. Result of closure of John Day Dam.

BASIC DATA REPORTS ON STREAM DISCHARGES IN THE UNITED STATES

The basic-data reports listed below, issued by the U.S. Geological Survey during the past three years, comprise 16 of 37 volumes that will present a compilation of streamflow records for the 5-year period, October 1965 through September 1970 (water years 1966–70). In the items listed below, "USGS WSP" means "U.S. Geological Survey Water-Supply Paper." The reports may be purchased for the prices shown from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402:

Surface water supply of the United States, 1966–70, Part 2, South Atlantic slope and eastern Gulf of Mexico basins, Volume 1, Basins from James River to Savannah River: USGS WSP 2104, 1,018 pages. 1974. $6.60.

Surface water supply of the United States, 1966–70, Part 3, Ohio River basin, Volume 2, Ohio River basin from Kanawha River to Louisville, Kentucky: USGS WSP 2108, 700 pages. 1972. $3.00.

Surface water supply of the United States, 1966–70, Part 3, Ohio River basin, Volume 4, Ohio River basin below Wabash River: USGS WSP 2110, 806 pages. 1973. $3.70.

Surface water supply of the United States, 1966–70, Part 4, St. Lawrence River basin, Volume 1, Basins of streams tributary to Lakes Superior, Michigan, and Huron: USGS WSP 2111, 774 pages. 1974. $5.10.

Surface water supply of the United States, 1966–70, Part 5, Hudson Bay and upper Mississippi basins, Volume 3, Upper Mississippi River basin below Keokuk, Iowa: USGS WSP 2115, 607 pages. 1973. $3.20.

Surface water supply of the United States, 1966–70, Part 6, Missouri River basin, Volume 1, Missouri River basin above Williston, North Dakota: USGS WSP 2116, 835 pages. 1974. $5.60.

Surface water supply of the United States, 1966–70, Part 6, Missouri River basin, Volume 2, Missouri River basin from Williston, North Dakota, to Sioux City, Iowa: USGS WSP 2117, 612 pages. 1973. $3.20.

Surface water supply of the United States, 1966–70, Part 6, Missouri River bas , Volume 3, Missouri River basin from Sioux City, Iowa, to Nebraska City, Nebraska: USGS WSP 2118, 710 pages. 1973. $3.45.

Surface water supply of the United States, 1966–70, Part 6, Missouri River basin, Volume 4, Missouri River basin below Nebraska City, Nebraska: USGS WSP 2119, 901 pages. 1972. $5.75.

Surface water supply of the United States, 1966–70, Part 7, Lower Mississippi River basin, Volume 2, Arkansas River basin: USGS WSP 2121, 931 pages. 1974. $6.15.

Surface water supply of the United States, 1966–70, Part 8, Western Gulf of Mexico basins, Volume 2, Basins from Lavaca River to Rio Grande: USGS WSP 2123. 861 pages. 1974. $5.70.

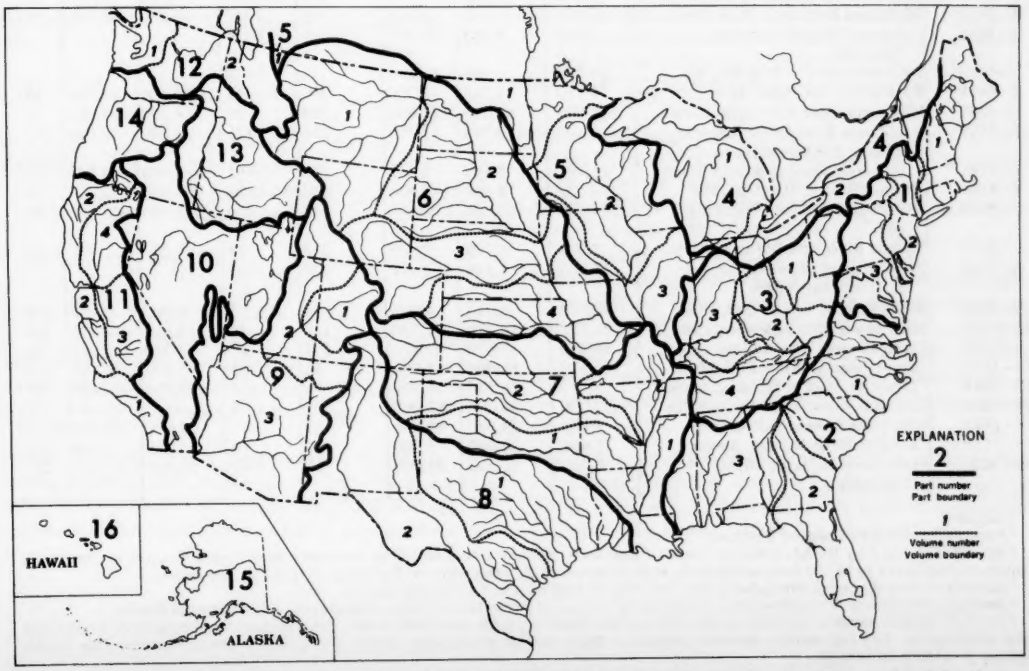
Surface water supply of the United States, 1966–70, Part 9, Colorado River basin, Volume 1, Colorado River basin above Green River: USGS WSP 2124, 543 pages. 1973. $2.95.

Surface water supply of the United States, 1966–70, Part 9, Colorado River basin, Volume 2, Colorado River basin from Green River to Compact Point: USGS WSP 2125, 634 pages. 1973. $3.20.

Surface water supply of the United States, 1966–70, Part 10, The Great Basin: USGS WSP 2127. 1,143 pages. 1974. $7.35.

Surface water supply of the United States, 1966–70, Part 12, Pacific slope basins in Washington, Volume 1, Pacific slope basins in Washington except Columbia River basin: USGS WSP 2132. 640 pages. 1974. $4.40.

Surface water supply of the United States, 1966–70, Part 14, Pacific slope basins in Oregon and lower Columbia River basin: USGS WSP 2135, 1,036 pages. 1972. $4.25.



Location of regions corresponding to part numbers (larger numbers) and volume numbers (smaller numbers) for the series of reports containing records of streamflow in the United States, 1966–70.

FLOW OF LARGE RIVERS DURING APRIL 1975

Station number*	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1970 (cfs)	April 1975					
				Monthly discharge (cfs)	Percent of median monthly discharge, 1941–70	Change in discharge from previous month (percent)	Discharge near end of month		
							(cfs)	(mgd)	Date
1–0140	St. John River below Fish River at Fort Kent, Maine.	5,690	9,397	13,870	65	+512	24,500	15,800	30
1–3185	Hudson River at Hadley, N.Y	1,664	2,791	6,700	79	+60	9,000	5,800	30
1–3575	Mohawk River at Cohoes, N.Y	3,456	5,450	11,500	89	+6	.....	.....	....
1–4635	Delaware River at Trenton, N.J	6,780	11,360	17,510	83	-26	10,700	6,900	24
1–5705	Susquehanna River at Harrisburg, Pa.	24,100	33,670	43,160	62	-41	33,100	21,400	30
1–6465	Potomac River near Washington, D.C.	11,560	[1] 10,640	15,160	87	-50	12,080	7,800	30
2–1055	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	4,847	6,930	119	-61	3,270	2,100	30
2–1310	Pee Dee River at Peedee, S.C	8,830	9,098	22,100	171	-31	11,500	7,400	25
2–2260	Altamaha River at Doctortown, Ga.	13,600	13,380	55,910	233	-6	47,200	30,500	28
2–3205	Suwannee River at Branford, Fla	7,740	6,775	17,660	171	+61	24,900	16,100	29
2–3580	Apalachicola River at Chattahoochee, Fla.	17,200	21,690	70,200	220	+10	34,700	22,400	29
2–4670	Tombigbee River at Demopolis lock and dam near Coatopa, Ala.	15,400	21,700	53,080	146	-40	18,600	12,000	28
2–4895	Pearl River near Bogalusa, La	6,630	8,533	19,400	150	-19	12,100	7,800	30
3–0495	Allegheny River at Natrona, Pa	11,410	[1] 18,700	23,390	64	-50	22,200	14,300	28
3–0850	Monongahela River at Braddock, Pa.	7,337	[1] 11,950	21,170	116	-25	41,800	27,000	28
3–1930	Kanawha River at Kanawha Falls, W.Va.	8,367	12,370	15,580	97	-61	12,000	7,800	30
3–2345	Scioto River at Higby, Ohio	5,131	4,337	6,520	88	-57	11,600	7,500	28
3–2945	Ohio River at Louisville, Ky[2]	91,170	110,600	229,700	119	-35	364,500	236,000	30
3–3775	Wabash River at Mount Carmel, Ill.	28,600	26,310	52,550	114	-38	73,800	47,700	30
3–4690	French Broad River below Douglas Dam, Tenn.	4,543	[1] 6,528	10,850	114	-55	.....	.....	....
4–0845	Fox River at Rapide Croche Dam, near Wrightstown, Wis.[2]	6,150	4,142	5,800	87	+49	.....	.....	....
02MC002 (4–2643.31)	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y.[3]	299,000	239,100	301,000	120	+4	297,000	192,000	30
050115	St. Maurice River at Grand Mere, Quebec.	16,300	24,900	20,700	50	+149	38,200	24,700	28
5–0825	Red River of the North at Grand Forks N. Dak.	30,100	2,439	17,450	197	+892	30,000	19,400	30
5–3300	Minnesota River near Jordan, Minn ..	16,200	3,306	9,312	117	+1,165	19,200	12,400	29
5–3310	Mississippi River at St. Paul, Minn ...	36,800	[1] 10,230	30,310	111	+389	71,400	46,100	28
5–3655	Chippewa River at Chippewa Falls, Wis.	5,600	5,062	14,600	149	+214	.....	.....	....
5–4070	Wisconsin River at Muscoda, Wis	10,300	8,457	14,840	97	+30	.....	.....	....
5–4465	Rock River near Joslin, Ill	9,520	5,288	17,200	206	+8	17,400	11,700	30
5–4745	Mississippi River at Keokuk, Iowa ...	119,000	61,210	125,800	107	+28	158,700	103,000	30
5–4855	Des Moines River below Raccoon River at Des Moines, Iowa.	9,879	3,796	12,760	250	+126	27,800	18,000	30
6–2145	Yellowstone River at Billings, Mont.	11,795	6,754	5,489	150	+62	7,000	4,500	30
6–9345	Missouri River at Hermann, Mo	528,200	78,480	123,400	129	+24	204,000	132,000	28
7–2890	Mississippi River near Vicksburg, Miss.[5]	1,144,500	552,700	1,552,000	158	+20	1,025,000	662,000	28
7–3310	Washita River near Durwood, Okla ..	7,202	1,379	2,239	208	-13	1,240	800	30
8–3130	Rio Grande at Otowi Bridge, near San Ildefonso, N.Mex.	14,300	1,530	2,068	139	+92	.....	.....	....
9–3150	Green River at Green River, Utah ...	40,600	6,369	4,038	59	-2	3,800	2,500	30
11–4255	Sacramento River at Verona, Calif ...	21,257	18,370	26,700	119	-40	19,600	12,700	25
13–2690	Snake River at Weiser, Idaho	69,200	17,670	40,800	194	+47	47,200	30,500	28
13–3170	Salmon River at White Bird, Idaho ..	13,550	11,060	5,904	56	+21	7,840	5,100	28
13–3425	Clearwater River at Spalding, Idaho ..	9,570	15,320	15,500	53	-19	20,800	13,400	28
14–1057	Columbia River at The Dalles, Oreg.[5]	237,000	194,000	208,000	109	-5	.....	.....	....
14–1910	Willamette River at Salem, Oreg	7,280	23,370	19,880	74	-49	24,620	15,900	26–30
15–5155	Tanana River at Nenana, Alaska	25,600	24,040	5,500	81	+2	5,800	3,700	26
8MF005	Fraser River at Hope, British Columbia.	78,300	95,300	38,000	64	+49	66,600	43,000	29

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.
*The U.S. station numbers as listed in this table are in a shortened form previously in use, and used here for simplicity of tabular and map presentation. The full, correct number contains 8 digits and no punctuation marks. For example, the correct form for station number 1–3185 is 01318500.

(Continued from page 11.)
times median flow for April, and above the normal range for the 2d consecutive month Downstream, in the adjacent area of Arizona, monthly mean discharge at the index station at head of Safford Valley, near Solomon, decreased seasonally but also remained in the above-normal range. In northwestern Arizona, flow in Verde River, at the index station below Tangle Creek, above Horseshoe Dam, increased contraseasonally as a result of moderate rains and snowmelt runoff, and was 4 times median for April.

In northern Utah, the level of Great Salt Lake rose 0.50 foot during the month (to 4,200.90 feet above mean sea level), 0.25 foot lower than a year ago and 2.00 feet higher than the average (1940-70) level for April.

Storage increased in some major reservoirs and decreased in others, and generally was above average in Arizona, California, and Colorado, and below average in Idaho, New Mexico, and Washington. Net increase in storage in the Colorado River Storage Project was 363,700 acre-feet during the month.

Ground-water levels declined in northwestern Washington (at Sumas, Whatcom County), in eastern Washington at Spokane, in northern Idaho (alluvium aquifer of Rathdrum Prairie) and southwestern Idaho (sand and gravel aquifer in Boise Valley), in Montana, Utah, and most of southern Arizona and New Mexico. In southern Idaho, levels changed little, if any, in wells representative of the Snake Plain aquifer at Atomic City and Rupert. In central Washington, levels rose at Cashmere in Chelan County. Monthend levels were below average in eastern and western Washington (Sumas and Spokane), in northern Idaho, in southern New Mexico, and in Montana and Utah; exceptions in Utah were above-average levels in northeastern part (Cache County) and southeastern part (at Blanding, San Juan County). Monthend levels were above average in central Washington at Cashmere.

ALASKA

Streamflow increased in southeastern and east-central parts of the State but decreased in some south-central and south-coastal basins. Flow of Chena River at Fairbanks, in east-central Alaska, increased slightly but was below the normal range. A record-high peak discharge of about 109 cfs occurred April 16 on Chester Creek at Arctic Boulevard in Anchorage.

Ground-water levels in the Anchorage area declined an average of 4 feet in wells tapping the confined aquifers; and rose slightly in wells tapping the unconfined aquifer.

WATER RESOURCES REVIEW

APRIL 1975

Based on reports from the Canadian and U.S. field offices; completed May 7, 1975

TECHNICAL STAFF
J.C. Kammerer, Editor-in-Chief
H.D. Brice, Associate Editor
J.K. Reid
T.H. Woodard

COPY PREPARATION
L.C. Fleshmon, Chief
S.L. Peterson
D.L. Radcliffe
M.C. Olson

EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for April based on 22 index stream-gaging stations in Canada and 130 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations which are located near the points shown by the arrows.

Streamflow for April 1975 is compared with flow for April in the 30-year reference period 1931–60 or 1941–70. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow for April is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being within the *normal range.* In the Water Resources Review the median is obtained by ranking the 30 flows of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median.

The normal is an average (but not an arithmetic average) or middle value; half of the time you would expect the April flows to be below the median and half of the time to be above the median. Shorter reference periods are used for the Alaska index stations because of the limited records available.

Statements about *ground-water levels* refer to conditions near the end of April. Water level in each key observation well is compared with average level for the end of April determined from the entire past record for that well or from a 20-year reference period, 1951–70. *Changes in ground-water levels,* unless described otherwise, are from the end of March to the end of April.

The Water Resources Review is published monthly. Special-purpose and summary issues are also published. Issues of the Review are free on application to the Water Resources Review, U.S. Geological Survey, Reston, Virginia 22092.

AVAILABILITY OF GROUND WATER IN THE LOWER PAWCATUCK RIVER BASIN, RHODE ISLAND

The accompanying abstract, location-map, and diagram are from the report, *Availability of ground water in the lower Pawcatuck River basin, Rhode Island,* by J.B. Gonthier, H.E. Johnston, and G.T. Malmberg: U.S. Geological Survey Water-Supply Paper 2033, 40 pages, 1974; prepared in cooperation with the Rhode Island Water Resources Board. The report may be purchased for $3.80 (GPO Stock Number 2401-02468) from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

ABSTRACT

The lower Pawcatuck River basin in southwestern Rhode Island (fig. 1) is an area of about 169 square miles underlain by crystalline bedrock over which lies a relatively thin mantle of glacial till and stratified drift. Stratified drift, consisting dominantly of sand and gravel, occurs in irregularly shaped linear deposits that are generally less than a mile wide and less than 125 feet thick; these deposits are found along the Pawcatuck River, its tributaries, and abandoned preglacial channels. Deposits of stratified sand and gravel constitute the principal aquifer in the lower Pawcatuck basin and the only one capable of sustaining yields of 100 gallons per minute or more to individual wells.

Water available for development in this aquifer consists of water in storage--potential ground-water runoff to streams--plus infiltration that can be induced from streams. Minimum annual ground-water runoff from the sand and gravel aquifer is calculated to be at least 1.17 cubic feet per second per square mile, or 0.76 million gallons per day per square mile. Potential recharge by induced infiltration is estimated to range from about 250 to 600 gallons per day per linear foot of streambed for the principal streams. In most areas, induced infiltration from streams constitutes the major source of water potentially available for development by wells.

Because subsurface hydraulic connection in the sand and gravel aquifer is poor in several places, the deposits are conveniently divisible into several ground-water reservoirs. The potential yield from five of the most promising ground-water reservoirs is evaluated by means of mathematical models. Results indicate that continuous withdrawals ranging from 1.3 to 10.3 million gallons per day, and totaling 31 million gallons per day, are obtainable from these reservoirs. Larger yields may be recovered by different well placement, spacing, construction and development, pumping practice, and so forth.

Withdrawals at the rates indicated will reduce streamflow downstream from pumping centers but generally will not result in streams going dry, provided the water is returned to the basin. Export of water from the basin will require careful consideration of the effects of such withdrawals on low streamflow. Export from the Pawcatuck basin of 27 million gallons per day, estimated to be available from ground-water reservoirs in the upper Pawcatuck basin, in addition to 37.5 million gallons per day available in the lower Pawcatuck basin, will markedly reduce low streamflow. The 90-percent duration flow of the Pawcatuck River at Westerly would be reduced from 75 million gallons per day to perhaps as little as 21 million gallons per day (fig. 2).

The chemical quality of water from both the sand and gravel aquifer and associated streams is suitable for most purposes. The water is soft, slightly acidic, and typically has a dissolved-solids content of less than 75 milligrams per liter. Some treatment may be required locally for removal of iron and manganese to meet recommended standards of the U.S. Public Health Service for drinking water.

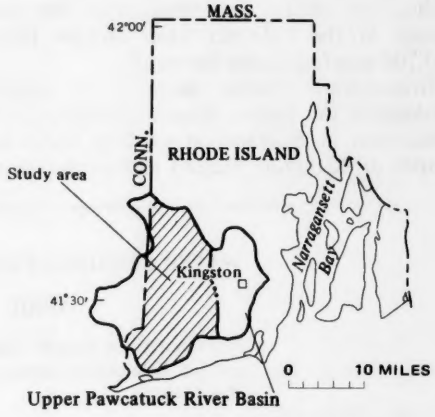
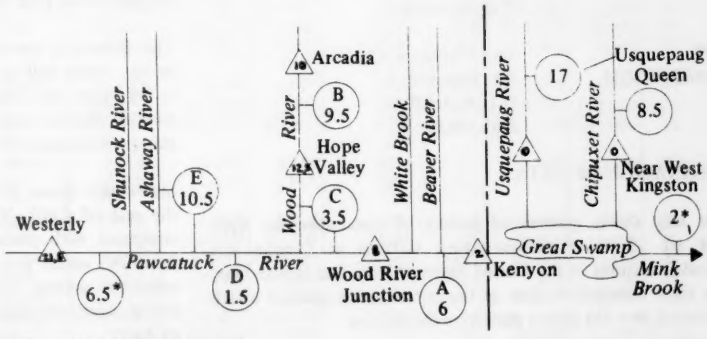


Fig. 1--Location of the lower Pawcatuck River basin (shaded area).



*Reported dependable yield

Fig. 2--Approximate flow of streams exceeded 90 percent of the time if all the ground-water reservoirs are pumped at the rates indicated in the circles and the water is exported from the basin. All figures are given to the nearest half million gallons per day.

***Reported dependable yield.**